

**CV: ANNE F. SHEEHAN**

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Last updated: October 21, 2021

**Education**

Ph.D., Massachusetts Institute of Technology, Geophysics, 1991

ITT Fellow, Visiting Student/Researcher, University of Reading, England, 1984-1985

B.S., University of Kansas, Geophysics (Highest Distinction and Honors), 1984

**Research Interests**

Earthquake seismology, ocean bottom seismology, induced seismicity, structure of the Earth's crust and upper mantle, mountain building processes, active tectonics, GPS geodesy, magnetotellurics, shallow subsurface geophysics

**Professional Experience**

- 2006 - present *Professor*, Department of Geological Sciences, University of Colorado, Boulder, Colorado.
- 2000 - 2006 *Associate Professor*, Department of Geological Sciences, University of Colorado, Boulder, Colorado 80309
- 1993 - 2000 *Assistant Professor*, Department of Geological Sciences, University of Colorado, Boulder, Colorado 80309
- 1993 - present *Fellow* - Cooperative Institute for Research in Environmental Sciences (CIRES) University of Colorado, Boulder, Colorado
- 2010 – present *Associate Director for Solid Earth Sciences* - Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado, Boulder, Colorado
- 2015 *Visiting Professor*, University of Luxembourg, Luxembourg City, Luxembourg
- 2014 *Visiting Professor*, Earthquake Research Institute, University of Tokyo, Tokyo, Japan
- 2007 *Green Scholar, Visiting Professor*, Institute of Geophysics and Planetary Physics, Scripps Institution of Oceanography, University of California, San Diego
- 2000 - 2001 *Visiting Professor*, Victoria University, Wellington, New Zealand
- 1992 - 1993 *Research Assistant Professor*, Seismological Laboratory, University of Nevada, Reno, Nevada
- 1991 - 1992 *Postdoctoral Fellow*, Lamont-Doherty Geological Observatory, Columbia University, Palisades, New York

**Honors and Awards**

- New Zealand Geophysics Prize (E. Warren-Smith lead, with 9 coauthors) 2019
- President, Seismology Section, American Geophysical Union 2019-20
- New Zealand Geophysics Prize (L. Wallace lead, with 7 coauthors) 2016
- American Geophysical Union (AGU) Fellow 2014
- College Scholar Award, University of Colorado College of Arts & Sciences 2014
- EarthScope Distinguished Lecturer 2013
- Erasmus Haworth Distinguished Alumni Award, Univ. Kansas Dept. Geology 2009
- Sloan Foundation Mentoring Award 2008
- IRIS/SSA Distinguished Lecturer 2007
- Green Scholar, IGPP, Scripps Inst. Oceanography, UCSD 2007

## Field Experience

- Co-Chief Scientist, Research Vessel R/V Marcus Langseth, Marine seismic reflection survey, Kodiak-Kodiak, AK, June 4-25, 2019.
- Seismological Field work, Alaska Peninsula, May 15-27, 2019. Download seismic data and perform repairs of seismometers in remote locations throughout the Alaska Peninsula
- Seismological Field work, San Luis Valley, Colorado, April 11-13, 2019. Deployment of seismometers near Great Sand Dunes National Park, Colorado.
- Chief Scientist, SKQ201816S, R/V Sikuliaq, Deployment of 30 ocean bottom seismometers and differential pressure gauges along Aleutian trench, Alaska, July 11-25, 2018.
- Weld County induced seismicity study, NE Colorado, telemetered earthquake network 2014-20
- Hikurangi Ocean Bottom Investigation of Tremor and Slow Slip (HOBITSS), New Zealand  
R/V Tangaroa, deploy ocean bottom seismometers, ocean bottom pressure recorders, 2014  
R/V Roger Revelle, recover ocean bottom sensors 2015
- Deep Rift Electrical Resistivity (DRIFTER) experiment, Magnetotellurics  
Rio Grande Rift, Colorado and New Mexico 2012, 2013
- Bighorns Arch Seismic Experiment (BASE), Wyoming 2009-2010
- Broadband seismometer deployment, Sheridan, Wyoming 2009
- Intermediate period seismometer deployment, Buffalo, Wyoming 2010
- Active source experiment, Buffalo and Shell, Wyoming 2010
- New Zealand Ocean Bottom Seismometer deployment,  
Marine Observations of Anisotropy near Aeteroa (MOANA)
- Cruise TN229, R/V Thomas G. Thompson, Lyttleton-Lyttleton, New Zealand, 2009
- Cruise RR1002, R/V Roger Revelle, Wellington-Wellington, New Zealand, 2010
- Boulder Creek Critical Zone Observatory,  
Shallow subsurface geophysics (seismic refraction, GPR, ERT) 2008, 2009  
EM31 ground conductivity, DC electrical resistivity 2012
- Rio Grande Rift GPS project, Colorado and New Mexico 2006-2013
- Joya de Ceren, El Salvador, Electrical resistivity survey of archeological site 2005
- Himalayan Nepal Tibet Seismic Experiment (HIMNT), Nepal 2001-2002
- New Zealand Marlborough Fault Zone Seismic Experiment 2000-2001

## Publications

### Books

Burger, R. L., A. F. Sheehan, and C. H. Jones, Introduction to Applied Geophysics: Exploring the Shallow Subsurface, 554 pages, *W. W. Norton Publishers*, New York, 2006.

### Peer-reviewed Papers (since 2012)

- Hossen, M. J., Mulia, I. E., Mencia, D., & Sheehan, A. F. (2021). Data assimilation for tsunami forecast with ship-borne GNSS data in the Cascadia subduction zone. *Earth and Space Science*, 8, e2020EA001390. <https://doi.org/10.1029/2020EA001390>
- Yarce, J., Sheehan, A., Roecker, S., & Mochizuki, K. (2021). Seismic velocity heterogeneity of the Hikurangi subduction margin, New Zealand: Elevated pore pressures in a region with repeating slow slip events. *Journal of Geophysical Research: Solid Earth*, 126, e2020JB021605. <https://doi.org/10.1029/2020JB021605>
- Nakai, J. S., Sheehan, A. F., Abercrombie, R. E., & Eberhart-Phillips, D. (2021). Near trench 3D seismic attenuation offshore Northern Hikurangi subduction margin, North Island, New Zealand. *Journal of Geophysical Research: Solid Earth*, 126, e2020JB020810. <https://doi.org/10.1029/2020JB020810>
- Plescia, S. M., A. F. Sheehan, S. S. Haines, L. L. Worthington, S. Cook, J. S. Ball (2020); Teleseismic *P*-Wave Coda Autocorrelation Imaging of Crustal and Basin Structure, Bighorn Mountains Region, Wyoming, U.S.A. *Bulletin of the Seismological Society of America* 2020; 111 (1): 466–475. doi: <https://doi.org/10.1785/0120200177>
- Barcheck, G., et al. (2020); The Alaska Amphibious Community Seismic Experiment. *Seismological Research Letters* doi: <https://doi.org/10.1785/0220200189>
- Zal, H. J., et al. (2020), Temporal and spatial variations in seismic anisotropy and VP/VS ratios in a region of slow slip, *Earth Planet. Sci. Letters*, 532, 2020, 115970, <https://doi.org/10.1016/j.epsl.2019.115970>.
- Hossen, M.J., Sheehan, A.F. & Satake, K (2020). A Multi-fault Model Estimation from Tsunami Data: An Application to the 2018 M7.9 Kodiak Earthquake. *Pure Appl. Geophys.* 177, 1335–1346. <https://doi.org/10.1007/s00024-020-02433-z>
- Wang Y, Maeda T, Satake K, Heidarzadeh M, Su H, Sheehan AF, Gusman AR. (2019). Tsunami Data Assimilation Without a Dense Observation Network, *Geophys. Res. Lett.*, 46 (4): 2045-2053.
- Feucht DW, Bedrosian PA, Sheehan AF. (2019), Lithospheric Signature of Late Cenozoic Extension in Electrical Resistivity Structure of the Rio Grande Rift, New Mexico, USA, *J. Geophys. Res.- Solid Earth*, 124 (3) (March 01, 2019): 2331-2351.

- Yarce J, Sheehan AF, et al. (2019), Seismicity at the Northern Hikurangi Margin, New Zealand, and investigation of the potential spatial and temporal relationships with a shallow slow slip event. *J. Geophys. Res. Solid Earth*, 124 (5), 4751-4766.
- Schulte-Pelkum V, Monsalve G, Sheehan AF, Shearer P, Wu F, Rajaure S. (2019) Mantle earthquakes in the Himalayan collision zone, *Geology*. 47 (9), 815-819.
- Warren-Smith E, Fry B, Wallace L, Chon E, Henrys S, Sheehan A, et al. (2019), Episodic stress and fluid pressure cycling in subducting oceanic crust during slow slip *Nature Geoscience*, 12 (6), 475-481.
- Murray, K., M. Murray, and A. Sheehan (2018), Active deformation near the Rio Grande Rift and Colorado Plateau as measured by continuous GPS, *Journal of Geophysical Research: Solid Earth*, 123, <https://doi.org/10.1029/2018JB016626>.
- Sheehan, A. F., A. R. Gusman, and K. Satake (2019), Improving forecast accuracy with tsunami data assimilation: The 2009 Dusky Sound, New Zealand, tsunami, *Journal of Geophysical Research: Solid Earth*, 124, <https://doi.org/10.1029/2018JB016575>.
- Todd, E. K., Schwartz, S. Y., Mochizuki, K., Wallace, L. M., Sheehan, A. F., et al. (2018). Earthquakes and tremor linked to seamount subduction during shallow slow slip at the Hikurangi Margin, New Zealand. *Journal of Geophysical Research: Solid Earth*, 123. <https://doi.org/10.1029/2018JB016136>
- Zietlow, D. W., A. F. Sheehan, and M. J. Bernardino (2018), Teleseismic S-wave tomography of South Island, New Zealand upper mantle, *Geosphere*, 14(3), 1343-1364, doi:10.1130/GES01591.1.
- Feucht, D. W., A. F. Sheehan, and P. A. Bedrosian (2017), Magnetotelluric imaging of lower crustal melt and lithospheric hydration in the Rocky Mountain Front transition zone, Colorado, USA, *J. Geophys. Res.: Solid Earth*, 122, 9489-9510, doi:10.1002/2017JB014474.
- Nakai, J., M. Weingarten, A. F. Sheehan, S. L. Bilek, S. Ge, (2017), Understanding spatial patterns of small-magnitude earthquakes in the Raton Basin from 2008-2010 in the context of larger magnitude historical and post-2010 seismicity, *Journal of Geophysical Research: Solid Earth*, 122, 8051-8065, <https://doi.org/10.1002/2017JB014415>.
- Brown, M.R.M., S. Ge, A. F. Sheehan, J. Nakai (2017), Evaluating the effectiveness of induced seismicity mitigation: Numerical modeling of wastewater injection near Greeley, Colorado, *J. Geophys. Res. Solid Earth*, 122, doi:10.1002/2017JB014456.
- Yeck, W.L., A.F. Sheehan, J.C. Stachnik, F.C. Lin (2017), Offshore Rayleigh group velocity observations of the South Island, New Zealand, from ambient noise data, *Geophysical Journal International*, v. 209, 827-841, 2017, doi: 10.1093/gji/ggx054
- Nakai, J. S., A. F. Sheehan, and S. L. Bilek (2017), Seismicity of the Rocky Mountains and Rio Grande Rift from the EarthScope Transportable Array and CREST temporary seismic networks, 2008–2010, *J. Geophys. Res. Solid Earth*, 122, doi:10.1002/2016JB013389.
- Gusman, A. R., I. E. Mulia, K. Satake, S. Watada, M. Heidarzadeh, and A. F. Sheehan (2016), Estimate of tsunami source using optimized unit sources and including dispersion effects during tsunami propagation: The 2012 Haida Gwaii earthquake, *Geophys. Res. Lett.*, 43, 9819–9828, doi:10.1002/2016GL070140.
- O'Rourke, C. T., G. E. Baker, and A. F. Sheehan (2016), Using P/S Amplitude Ratios for Seismic Discrimination at Local Distances, *Bulletin of the Seismological Society of America*, v. 106, no. 4, doi:10.1785/0120160035.
- Yeck, W. L., A. F. Sheehan, H. M. Benz, M Weingarten, J Nakai (2016), Rapid response, monitoring, and mitigation of induced seismicity near Greeley, Colorado, *Seismological Research Letters*, v. 87, no. 4, July/August 2016, doi:10.1785/0220150275.
- Wallace, L. M., S. C. Webb, Y. Ito, K. Mochizuki, R. Hino, S. Henrys, S. Y. Schwartz, A. F. Sheehan (2016), Slow slip near the trench at the Hikurangi subduction zone, New Zealand, *Science*, 06 May 2016, Vol. 352, Issue 6286, pp. 701-704, DOI: 10.1126/science.aaf2349
- Ball, J. S., A. F. Sheehan, J. C. Stachnik, F.-C. Lin, W. L. Yeck, and J. A. Collins (2016), Lithospheric shear velocity structure of South Island, New Zealand, from amphibious Rayleigh wave tomography, *J. Geophys. Res. Solid Earth*, 121, 3686–3702, doi:10.1002/2015JB012726.
- Zietlow, D. W., P. H. Molnar, and A. F. Sheehan (2016), Teleseismic *P* wave tomography of South Island, New Zealand upper mantle: Evidence of subduction of Pacific lithosphere since 45 Ma, *J. Geophys. Res. Solid Earth*, 121, 4427–4445, doi:10.1002/2015JB012624.
- Gusman, A. R. A. F. Sheehan, K. Satake, M. Heidarzadeh, I. E. Mulia, and T. Maeda (2016), Tsunami data assimilation of Cascadia seafloor pressure gauge records from the 2012 Haida Gwaii earthquake, *Geophysical Research Letters*, vol. 43, issue 9, p. 4189-4196, doi:10.1002/2016GL068368.
- O'Rourke, C. T., A. F. Sheehan, E. A. Erslev, and M. L. Anderson (2015), Small-Magnitude Earthquakes in North-Central Wyoming Recorded during the Bighorn Arch Seismic Experiment *Bulletin of the Seismological Society of America*, vol. 106, no. 1, p. 281-288, doi:10.1785/0120150114
- Worthington, L. L., K. C. Miller, E. A. Erslev, M. L. Anderson, K. R. Chamberlain, A. F. Sheehan, W. L. Yeck, S. H. Harder, and C. S. Siddoway (2015), Crustal structure of the Bighorn Mountains region: Precambrian influence on Laramide shortening and uplift in north-central Wyoming, *Tectonics*, 34, doi:10.1002/2015TC003840.
- Sheehan, A. F., A. R. Gusman, M. Heidarzadeh, and K. Satake (2015), Array observations of 2012 Haida Gwaii tsunami using Cascadia Initiative absolute and differential seafloor pressure gauges, *Seismological Research Letters*, v. 86, no. 5, September/October 2015, doi: 10.1785/0220150108.
- Karalliyadda, S. C., M. K. Savage, A. Sheehan, J. Collins, D. Zietlow, and A. Shelley (2015), S-wave splitting in the

- offshore South Island, New Zealand: Insights into plate-boundary deformation, *Geochem. Geophys. Geosyst.*, 16, doi:10.1002/2015GC005882.
- McGarr, A., B. Bekins, N. Burkardt, J. Dewey, P. Earle, W. Ellsworth, S. Ge, S. Hickman, A. Holland, E. Majer, J. Rubinstein, and A. Sheehan (2015), Coping with earthquakes induced by fluid injection, *Science*: 347 (6224), 830-831. (DOI:10.1126/science.aaa0494).
- Ball, J. S., A. F. Sheehan, J. C. Stachnik, F.-C. Lin, and J. A. Collins (2014), A joint Monte Carlo analysis of seafloor compliance, Rayleigh wave dispersion and receiver functions at ocean bottom seismic stations offshore New Zealand, *Geochem. Geophys. Geosyst.*, 15, 5051–5068, doi:10.1002/2014GC005412.
- Yeck, W. L., A. F. Sheehan, M. Anderson, E. A. Erslev, K. C. Miller, C. S. Siddoway (2014), Structure of the Bighorn Mountain region from teleseismic receiver function analysis: Implications for the mechanics of Laramide shortening, *J. Geophys. Res.*, 119, doi:10.1002/2013JB010769.
- Godin, O. A., N. A. Zabolin, A. F. Sheehan, and J. A. Collins (2014), Interferometry of infragravity waves off New Zealand, *J. Geophys. Res.-Oceans*, 119, doi:10.1002/2013JC009395, 2014.
- Sheehan, A. F., T. L. de la Torre, G. Monsalve, G. A. Abers, and B. R. Hacker (2014), Physical state of Himalayan crust and uppermost mantle: Constraints from seismic attenuation and velocity tomography, *J. Geophys. Res. Solid Earth*, 119, doi:10.1002/2013JB010601.
- Zietlow, D. W., A. F. Sheehan, P. H. Molnar, M. K. Savage, G. Hirth, J. A. Collins, and B. H. Hager (2014), Upper mantle seismic anisotropy at a strike slip boundary: South Island, New Zealand, *J. Geophys. Res. Solid Earth*, 119, doi:10.1002/2013JB010676.
- O'Rourke, C., A. Sheehan, E. Erslev, and K. Miller (2013), Estimating Basin Thickness using a high density passive source geophone array, *Earth & Planetary Science Letters*, <http://dx.doi.org/10.1016/j.epsl.2013.10.035>.
- Yeck, W., L., A. F. Sheehan, and V. Schulte-Pelkum (2013), Sequential H-K Stacking to obtain accurate crustal thicknesses beneath sedimentary basins, *Bulletin of the Seismological Society of America*, vol. 103, no. 3, p. 2142-2150, doi: 10.1785/0120120290.
- Godin, O. A., N. A. Zabolin, A. F. Sheehan, Z. Yang, and J. A. Collins (2013), Power spectra of infragravity waves in a deep ocean, *Geophysical Research Letters*, V. 40, no. 10, p. 2159-2165, doi: 10.1002/grl.50418.
- Wech, A.G., A. F. Sheehan, C. M. Boese, J. Townend, and T. A. Stern (2013), Tectonic tremor recorded at ocean bottom seismometers, *Seismological Research Letters*, 84(5), p. 752-758, doi: 10.1785/0220120184.
- Boese, C.M., T. A. Stern, J. Townend, S. Bourguignon, A. Sheehan, and E. G. C. Smith (2013), E.G.C., Sub-crustal earthquakes within the Australia-Pacific plate boundary zone beneath the Southern Alps, New Zealand, *Earth and Planetary Science Letters*, 376, p. 212-219.
- Yang, Z., A. F. Sheehan, J. A. Collins, G. Laske (2012), The character of seafloor ambient noise recorded offshore New Zealand: Results from the MOANA ocean bottom seismic experiment, *Geochem. Geophys. Geosyst.*, Vol. 13, Q1001, doi:10.1029/2012GC004201.
- Stachnik, J. C., A. Sheehan, D. Zietlow, Z. Yang, J. Collins, and A. Ferris (2012), Determination of ocean bottom seismometer orientation via Rayleigh wave polarization, *Seismol. Res. Lett.*, 83(4), 704-713, 2012.
- Berglund, H.T., A.F. Sheehan, M. Murray, M. Roy, A. R. Lowry, R.S. Nerem, and F. Blume (2012), Distributed Deformation across the Rio Grande Rift, Great Plains, and Colorado Plateau, *Geology*, 40, 23-36, doi:10.1130/G32418.1.
- Yang, Z., A. Sheehan, W. Yeck, K. Miller, E. Erslev, L. Worthington, and S. Harder (2012), Imaging basin structure with teleseismic virtual source reflection profiles, *Geophys. Res. Lett.*, 39, L02303, doi:10.1029/2011GL050035.

### Courses Taught

Introduction to Physical Geology (GEOL 1010); Our Deadly Planet (GEOL 1170) ; Principles of Geophysics (GEOL 4130, GEOL 3330); Field Geophysics (GEOL 4714/5714); Geophysical Inverse Theory (GEOL/PHYS 6670); Graduate Seminar in Geophysics (GEOL/PHYS/ASTR 6650); Grad Seminar: Induced Earthquakes; Grad Seminar: Magnetotellurics; Grad Seminar: Geomagnetism; Grad Seminar: Earthquake Source Mechanics ; Grad Seminar: Earthquake Seismology; Earth and Planetary Physics I, Seismology (GEOL/PHYS/ASTR 6610)

### Professional Service

*Incorporated Research Institutions for Seismology (IRIS)* Chair, Ocean Bottom Instrumentation Pool Oversight Committee (OBSIP OC), 2015-2019; IRIS Board of Directors, 2005-2008; Passcal Committee, GSN Committee.

*EarthScope* EarthScope Speaker, 2013; Pre-GSA EarthScope workshop organizer, 2013; EarthScope National Meeting, Organizing Committee, 2009

*American Geophysical Union* Seismology Section, President, 2019-2020; Seismology Section, President-elect, 2017- 2018 Seismology Section, Fellows committee, 2016- 2018; Paul Silver Award Committee, 2017-2020 Gutenberg Lecture Committee, 2014-2015, 2020

*State of Colorado* Testimony regarding induced seismicity, COGCC hearing, 2014, 2020 Colorado Earthquake Hazard Mitigation Council, 2000-2009

*United States Geological Survey (USGS)* National Earthquake Hazard Program Review Panels, 2019, 2021 *National Science Foundation* Panels 2006, 2011-2013, 2015, 2020